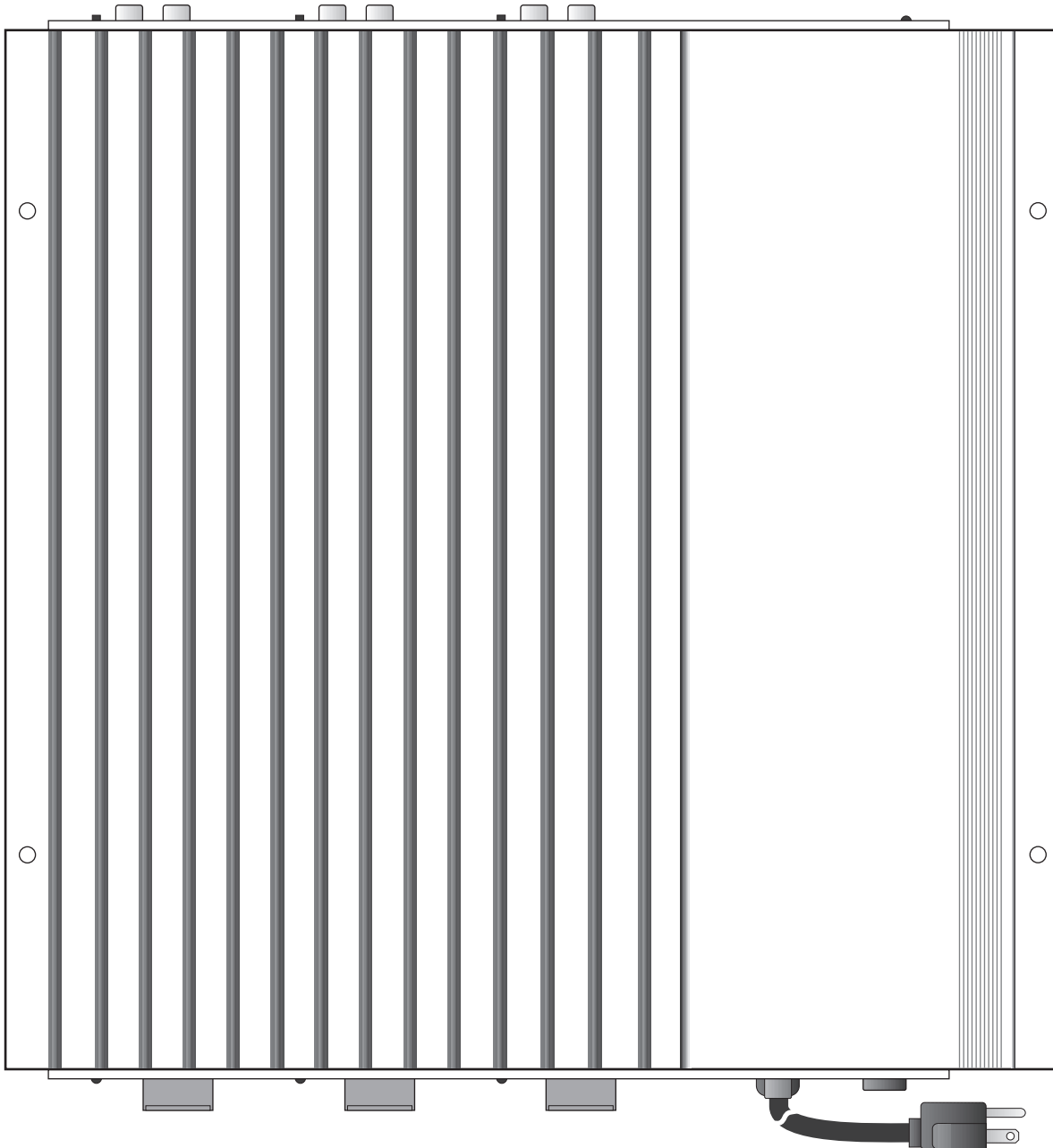

INSTALLATION INSTRUCTIONS

PA640 SIX CHANNEL POWER AMPLIFIER



GENERAL INFORMATION

To enhance the ease of installation and obtain optimum performance from the PA640, we recommend that you first become familiar with all its features and special capabilities by studying the descriptions and

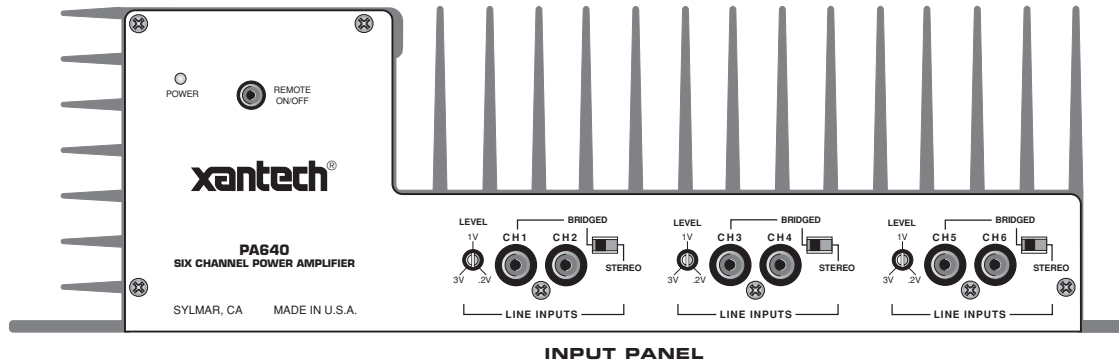


Fig. 1 The Model PA640

instructions in this manual.

The PA640 was designed to meet the audio power amplifier needs of custom installed multi-zoned systems with high sonic quality. It's 6-5-4-3 multichannel capability permits a wide variety of other uses as well, such as surround sound home theater applications. Specific features and technology are as follows:

- **Cost/Size Efficiency.** The PA640 features six 40-watt power amplifiers. This permits each PA640 to drive 3-zones in a multi-zone system -- each with a 40-watt stereo amplifier per zone. The low profile design, plus multiple amplifiers in a single package, delivers high quality at a reasonable price.
- **Input Level Flexibility.** The input levels are individually adjustable (per stereo pair) from a low of 0.2 volts up to 3.3 volts. This gives the installer the ability to adjust the overall gain of the system or zone. For instance, there may be a need to adjust the amplifier to deliver a controlled, maximum sound level into a zone when the volume control on the preamp is set to maximum. This would act as a volume limiter for any particular zone (i.e. to prevent the kids from over-driving wall speakers, etc.).
- **6-5-4-3 Output Flexibility.** Each pair of amplifiers can be bridged to allow several channel and power output capabilities. It can be configured into four power packages as follows:
 - Six 40-watt amplifiers.
 - One 140 and four 40-watt amplifiers.
 - Two 140 and two 40-watt amplifiers.
 - Three 140-watt amplifiers.

This gives the PA640 added use in many other applications, such as driving surround sound speaker systems.

- **Low Impedance Capability.** Each amplifier is 2-Ohm safe under music conditions in stereo mode and 4-Ohm safe when bridged. This means, for instance, that you can drive two pairs of 8-Ohm speakers in stereo mode in each zone with ease.
- **Discrete Output Devices.** All output and driver transistors are separate devices connected in a full-complimentary Darlington configuration. This provides highest reliability in concert with highly linear dynamic performance free of T.I.M. and slew induced distortions.
- **Auto Protection Circuit.** Protects the PA640 if a short or very low impedance is detected at the speaker terminals. Each amplifier pair is protected separately, with an LED indicator showing which pair is in protection. Normal operation is restored automatically within 3 to 4 seconds after the short is removed.
- **Remote ON/OFF Jack.** This jack allows the PA640 to be powered on and off by a positive DC voltage ranging between 4 and 30 volts (11 mA @ 12 V). Specifically, it permits the 12 volt CO (Control Output) from the Xantech ZPR68 to power one or more PA640's on and off automatically with zone ON/OFF commands.

PA640 PANEL DESCRIPTIONS

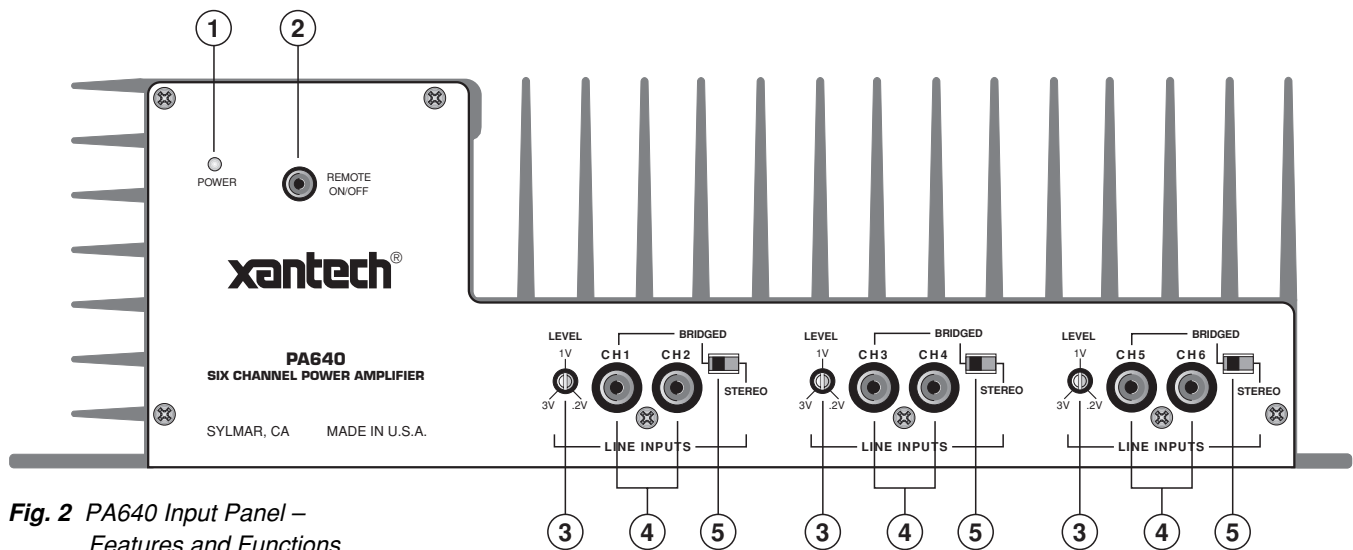


Fig. 2 PA640 Input Panel –
Features and Functions

- 1. POWER** Indicator LED. This green LED lights when power is turned on by the POWER switch (item # 8) or by a DC voltage applied to the REMOTE ON/OFF jack (item #2).
- 2. REMOTE ON/OFF** Jack. This 3.5mm mono mini jack allows the PA640 to be powered on and off by a positive DC voltage ranging between 4 and 30 volts (11 mA @ 12 V). For instance, it permits the 12 Volt CO (Control Output) from a Xantech ZPR68 IR controlled preamp to power the PA640 ON and OFF automatically with zone ON/OFF commands. The DC Voltage must be applied continuously to hold the ON condition and go to less than 0.5 Volt for the OFF condition.

NOTE: The POWER switch (item #8) must be left in the MANUAL OFF (REMOTE ON/OFF) position to permit the REMOTE ON/OFF jack to operate.

- 3. Input LEVEL** Control. This screwdriver adjustable control (for each stereo or bridged pair) allows the input level for full rated power output to be adjusted over a range of 0.2 volts to 3.3 volts (24.3 dB). Normally you would adjust the driving preamp to max. volume, then set this control to the maximum volume that the client desires for a given zone or room. This prevents the system from being driven to potentially destructive power levels.
- 4. LINE INPUTS.** These RCA type jacks are the audio inputs for the amplifier. Connect them to the OUTPUT jacks of the driving preamp with good quality RCA type patch cables. Note that the inputs are marked CH1, CH2, CH3, etc., signifying the individual channels. They correspond to the like marked speaker terminals on the OUTPUT & AC panel (item # 7). When the switches (item #5) are set to the BRIDGED mode, CH1, CH3 and CH5 become the active inputs and CH2, CH4 and CH6 are disabled.
- 5. BRIDGED/STEREO** Switches. These switches allow each of the three pair of amplifiers to be placed in either the BRIDGED 140 Watt (single channel) mode, or in the STEREO 40 Watts/channel (two channel) mode.

CAUTION: Be sure to have the POWER turned OFF when changing the position of this switch and when making the corresponding speaker connection changes.

PA640 PANEL DESCRIPTIONS

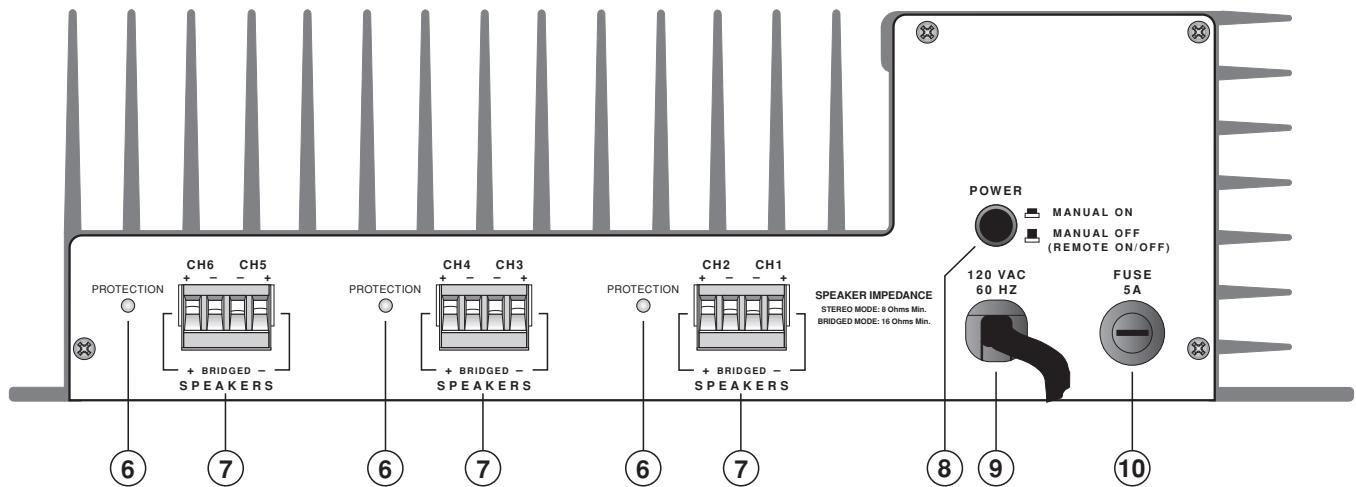


Fig. 3 PA640 Output & AC Panel – Features and Functions

- 6. PROTECTION** Indicator LED's. These red LED's, one for each pair of channels, light for 3 to 4 seconds when the amplifier senses a short circuit or a very low load impedance (under 2-Ohms) at the speaker terminals. This protects the amplifier from potentially harmful conditions. If the short condition or the input signal is not removed, the amplifier will continue to cycle on and off at the 3 to 4 second interval.

CAUTION: Do not allow this to continue for a lengthy period of time. Reduce the volume, remove the short or low impedance condition and try again.

NOTE: The PROTECTION LED's will also light for 5 to 8 seconds when the amplifier is first turned on. This is a normal muting function that quiets the amplifier during start-up.

- 7. SPEAKER** Terminals. These plug-in 4-terminal screw connectors permit speaker wire sizes up to 12 gauge. When making connections for the STEREO mode, be sure to observe the "+" and "-" polarity markings, just under the CH1, CH2, etc., markings, for each wire pair going to the speakers.

CAUTION: When making connections for the BRIDGED mode, remember only one speaker is being attached per amplifier pair. Be sure to observe the outer "+" and "-" polarity markings on the 4-terminal connector, as shown on the panel, for the one wire pair connecting to the speaker.

- 8. POWER** Switch. When pressed to the IN position, power is applied to the PA640. This is the MANUAL ON position. When pressed again, it releases to the OUT position (MANUAL OFF), turning the unit OFF.

In addition, this switch must be left in the MANUAL OFF (REMOTE ON/OFF) position to permit external DC Voltage control of power ON/OFF for the PA640.

NOTE: The PA640 may also be powered ON/OFF with an external AC line switch (such as the switched AC outlet of a preamp, timer, etc.). For this type of operation, leave the POWER switch depressed to the MANUAL ON position.

- 9. AC LINE** Cord. Depending on the application, plug into a switched or un-switched 120V 60 Hz AC outlet.

- 10. FUSE.** When required, replace only with a fuse of the same type and rating (5 A 220V AC). Replacement with a fuse of higher rating will not protect the amplifier and will void the warranty.

INSTALLATION

PHYSICAL LOCATION AND MOUNTING

When you mount the PA640, you need to plan its location carefully. Pay close attention to each of the following factors:

1. The amplifier is convection cooled. That is, it depends on the natural free flow of air over the heat dissipating fins for adequate cooling.
2. If mounted in an equipment cabinet or other confining location, allow at least 3 inches of space above the heat sink fins (see Fig. 4). Be sure there are large openings to allow the entry of cool air and the escape of warm air.
3. If the cabinet contains other heat generating components, or you are using several PA640's in a large multi-zone system, you will have to pay even closer attention to adequate ventilation.
4. Do not hesitate to use fans, if necessary, to ensure a constant flow of air over the PA640's and the other heat generating components.
5. The PA640 will operate when mounted either horizontally or vertically. The vertical placement is preferred, however, since it will run approximately 5% to 10% cooler when so oriented. See Fig. 5.
6. In multi-zone installations, you will have large bundles of leads to accommodate audio, video and speaker connections. Be sure to allow enough room for the leads and dress them so that they do not block airflow.
7. Mounting the PA640 onto an aluminium panel (rather than on wood or other non-heat conducting material) will add additional heat dissipation capability. See Fig. 4 & 5.
8. Use the 4 holes on the chassis skirts and the screws provided to mount the PA640.

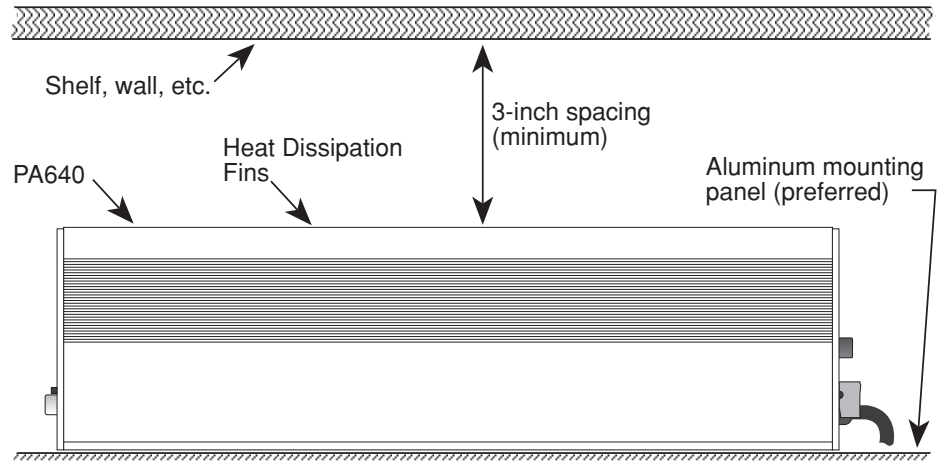


Fig. 4 Horizontal Mounting

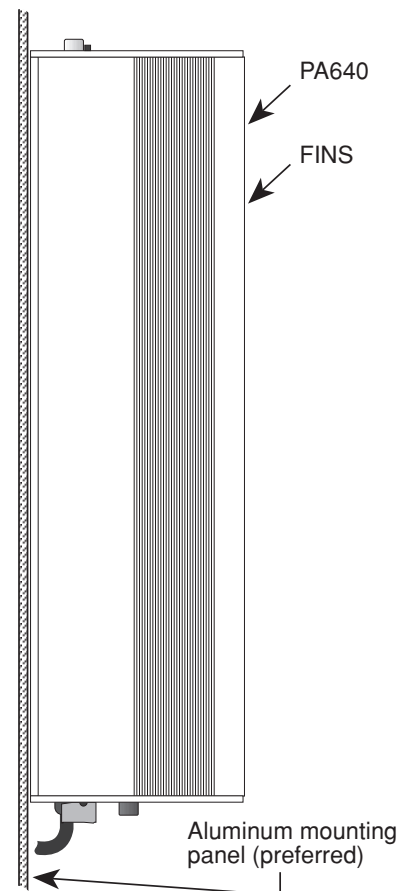


Fig. 5 Vertical mounting (preferred)

INSTALLATION (cont'd)

CONNECTING THE PA640

I When making connections to the PA640 be sure the power cord is unplugged. Proceed as follows:

Stereo Mode Connections

1. Using good quality RCA type patch cables, connect the L and R OUTPUT jacks of the driving preamp to the CH1, CH2, etc. LINE INPUTS jacks on the PA640. Do this for each amplifier pair. Refer to Fig. 6.
2. Slide the BRIDGED/STEREO switch to the **STEREO** position.
3. Using good quality speaker wire, connect the individual speaker leads to the 4-terminal "SPEAKERS" connectors on the PA640 as shown.
4. Even though the PA640 is 2-Ohm safe in Stereo Mode, make sure the impedance presented to the speaker terminals by the speakers (or any combination of speakers) is 4-Ohms minimum.
5. Be sure to observe correct polarity by connecting the "+" and "-" terminal from each channel on the PA640 to the corresponding "+" and "-" terminals on each speaker. This will ensure correct "phasing". See Fig. 6 and Speaker Phasing below.

Since the connectors are removable, you may unplug them for ease of lead assembly.

6. As a rule of thumb, use 18 gauge speaker wire for speaker runs up to 30', 16 gauge up to 70', and 14 gauge up to 150'. The 4-terminal connectors accept wire sizes up to 12 gauge max.
7. Strip the insulation back about 1/4" and twist the strands on each lead to prevent fraying.

CAUTION: After lead ends are inserted and the screws tightened down, be sure there are no free strands that could cause shorting!

Speaker Phasing

To obtain stable imaging and full bass response, it is imperative that stereo speakers be connected "in phase" with each other. You can verify this as follows:

1. If the "+" (positive) and "-" (negative) terminals on your speakers are correctly marked, and visible, and you have wired the system as shown in Figs. 6 and 7, then the system will be "in phase". No further action is required.

Most manufacturer's identify the positive terminal with a red binding post, a "+" sign, or a red dot.

2. If you are unsure of the markings, you can verify the phasing. Using a mono sound source, such as AM radio, alternately reverse the leads to one of the speakers. Pick the connection that delivers a solid center image between the speakers along with best bass response.

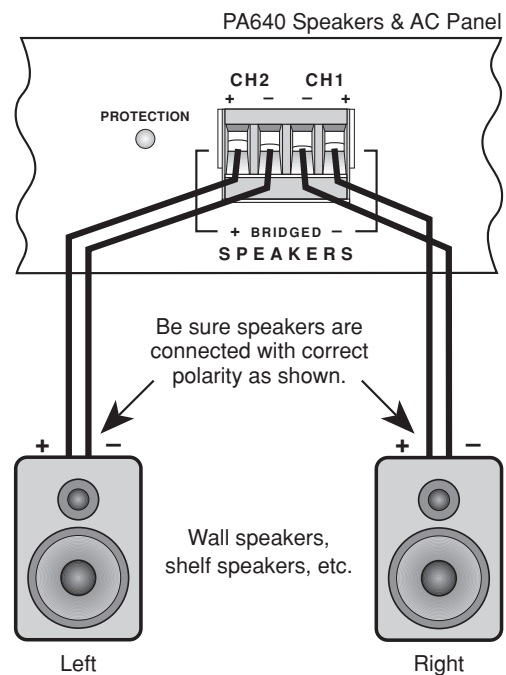
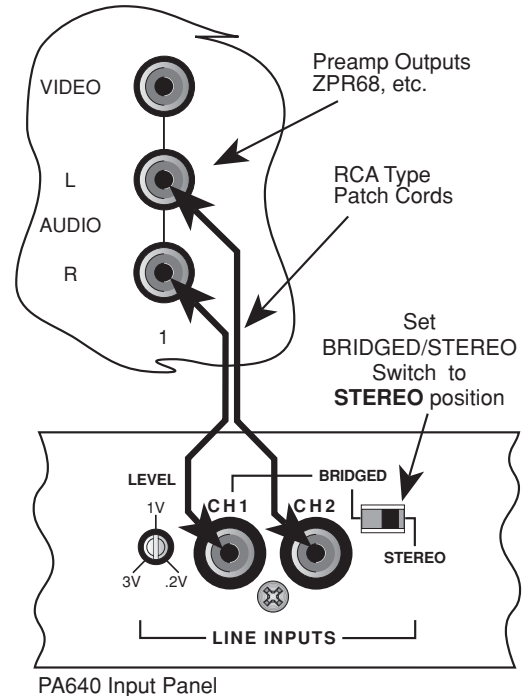


Fig. 6 STEREO Mode Connections

INSTALLATION (cont'd)

Bridged Mode Connections

In general, it is recommended that the **BRIDGED mode not be used in multi-room applications where several speakers are driven through room volume controls and the like**. For such applications, use the STEREO mode. Instead, use the BRIDGED mode for single speaker, higher power applications, such as in surround sound systems. Use speakers with an impedance rating of 8-Ohms minimum.

To make connections for the BRIDGED mode, follow the steps given before for stereo connections, but with the following exceptions:

1. Connect RCA type patch cables from the OUTPUT jacks of the driving preamp or other source to the PA640 LINE INPUT jacks marked CH1, and/or CH3, and/or CH5. Do this for just the amplifier pairs you wish to run in the bridged mode.

(Jacks marked CH2, CH4 & CH6 are disabled in BRIDGED mode). Refer to Fig. 7.

CAUTION: Be sure power is OFF when connecting or switching the amp for BRIDGED operation.

2. Slide the BRIDGED/STEREO switch to the **BRIDGED** position. NOTE: Do this only on the amplifier pairs you wish to run in the bridged mode!
3. Connect one speaker wire pair between the 4-terminal "SPEAKERS" connectors on the PA640 and the speakers as shown in Fig. 7. Be sure to use only the two outer terminals marked "+" and "-" on the 4-terminal connector as shown on the panel for BRIDGED connections.

NOTE: Only one speaker is connected per amplifier pair in the BRIDGED mode!

CAUTION: When operating in the BRIDGED mode (particularly when bench testing the amplifier) do not make a ground or any other kind of connection to the amplifier speaker terminals other than those to the individual speakers as shown. Failures caused by inappropriate connections are not covered under the warranty.

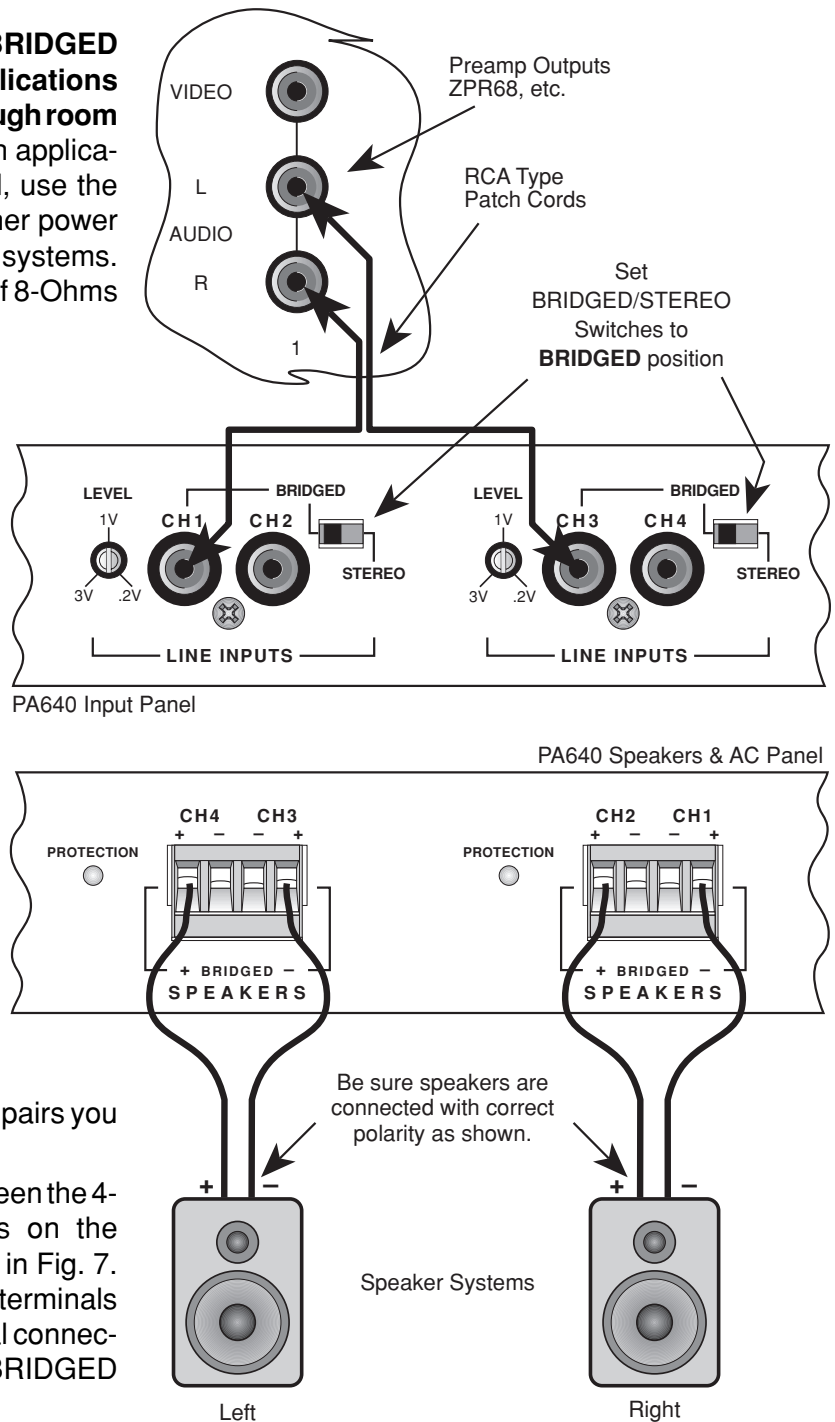


Fig. 7 BRIDGED Mode Connections

INSTALLATION (cont'd)

Connecting the REMOTE ON/OFF Jack

As mentioned under "PA640 PANEL DESCRIPTIONS", the REMOTE ON/OFF jack allows the power to the PA640 to be turned ON and OFF by a remotely applied DC Voltage. Figs. 8 and 9 are typical applications using this feature.

Fig. 8 illustrates how a PA640 can be switched ON and OFF via the switched AC outlet on the rear of a preamplifier. When the preamplifier Power Switch is switched ON, power is applied to the DC adapter which in turn applies 4V to 30V DC to the PA640, switching it ON. Similarly, when the preamplifier is switched OFF, the DC voltage to the PA640 is removed, turning it OFF.

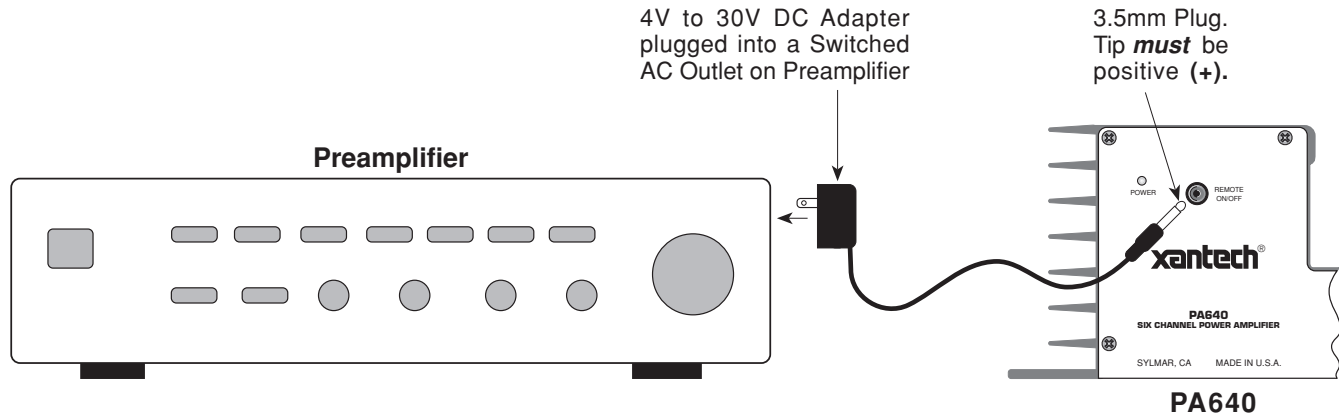


Fig. 8 REMOTE ON/OFF Jack Connections

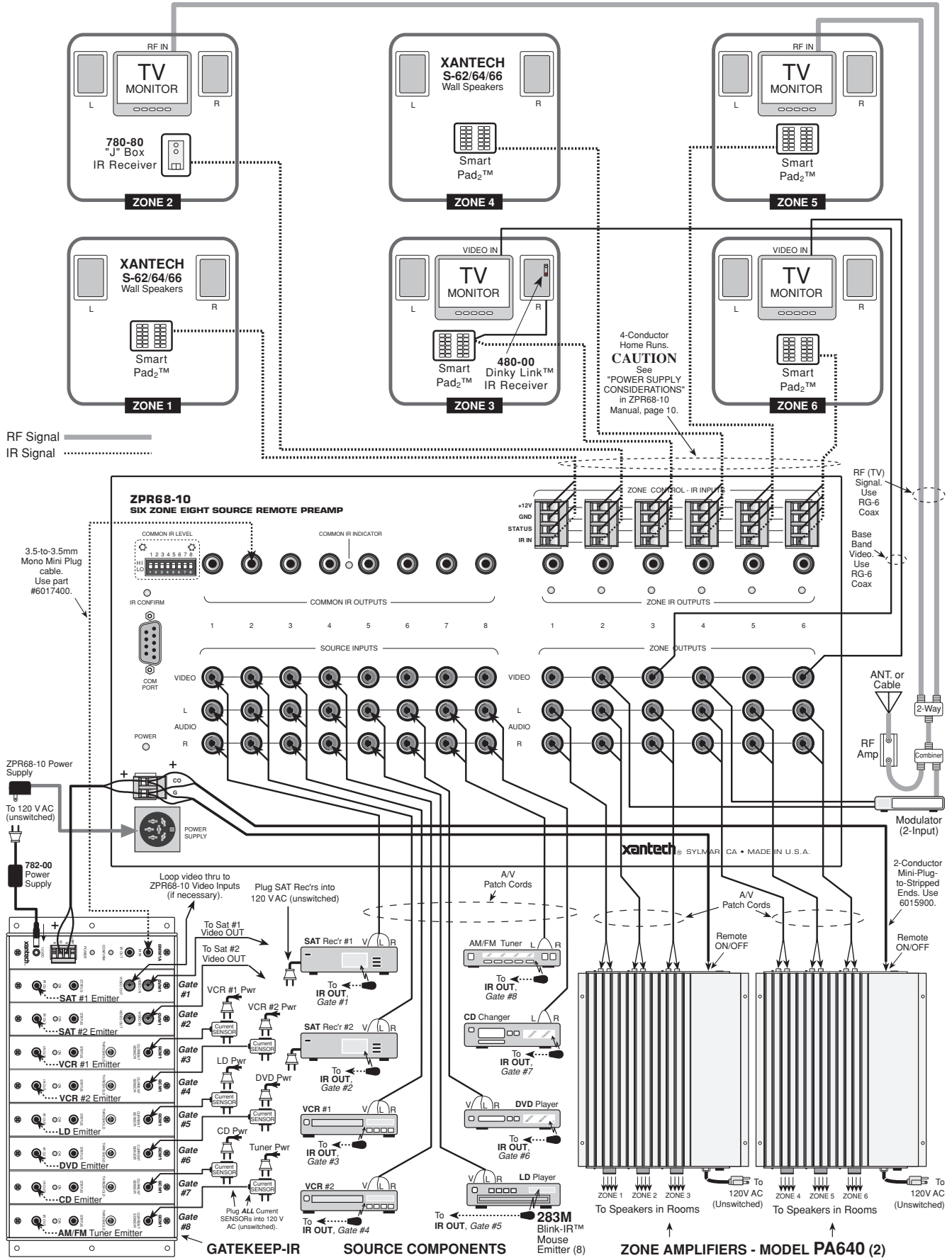
Fig. 9 shows two PA640's in a typical multi-room system with a Xantech ZPR68 6-zone preamp. In this case, the common +12V CO (control output) from the ZPR68 is used to remotely turn the PA640 ON/OFF. When any one of the zones is turned on, the common +12V CO goes high, turning each of the PA640's ON. Similarly, when the last zone is turned OFF, the +12V CO drops to 0V and turns the PA640's OFF.

TROUBLE SHOOTING

If you encounter a problem, please review the items in the following list. Be sure, in addition, to check other system components, such as preamplifiers, CD players, speakers, speaker wiring, etc., that may be at fault.

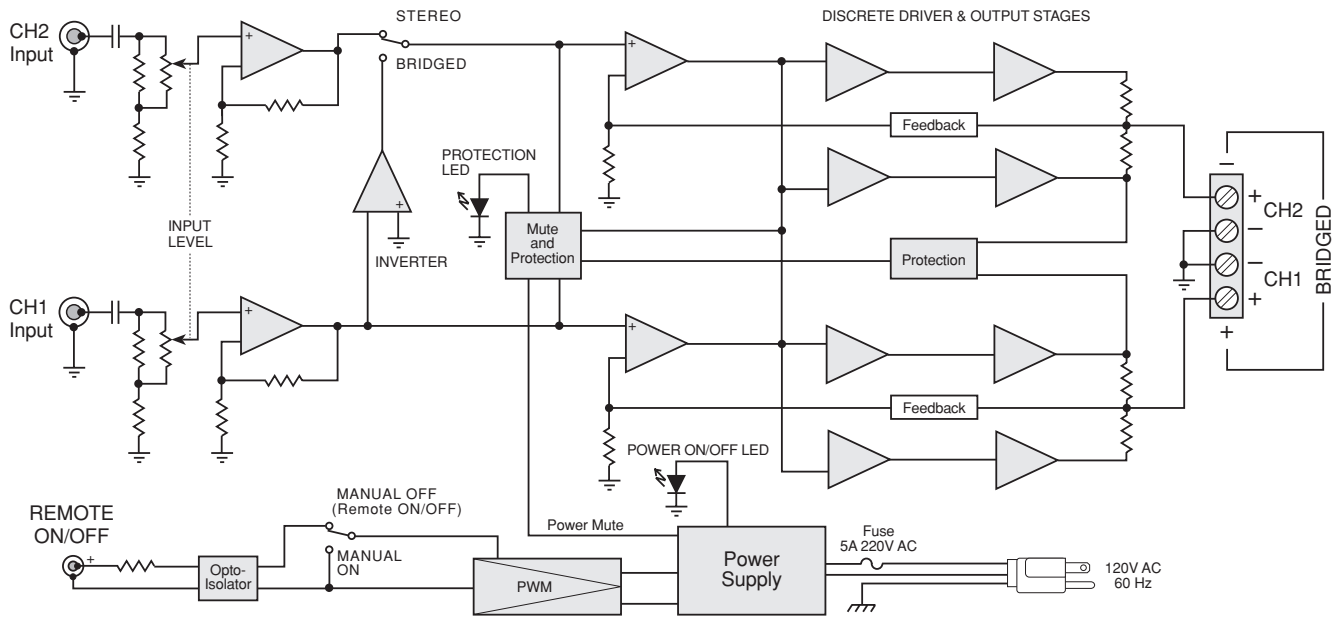
PROBLEM	PROBABLE CAUSE AND SOLUTION
1. Power Indicator does not light – no sound.	<ul style="list-style-type: none"> • Check line cord for good contact in a live AC outlet. • If REMOTE ON/OFF jack is used, be sure applied voltage is between +4V and +30V DC with proper polarity. See Fig. 8.
2. No sound from CH2, CH4 or CH6 when stereo operation is desired.	<ul style="list-style-type: none"> • BRIDGED/STEREO switch is incorrectly set to BRIDGED position. Set to STEREO position. See Fig. 6.
3. Sound cuts in and out every 3 to 5 seconds.	<ul style="list-style-type: none"> • Speaker load impedance is less than 2-Ohms for Stereo mode or less than 4-Ohms for Bridged mode. Make changes in speakers as necessary to obtain higher impedance.
4. PA640 does not turn OFF when REMOTE input voltage goes to 0 Volts.	<ul style="list-style-type: none"> • Be sure that the POWER switch (item 8, fig. 3) is set to the MANUAL OFF (REMOTE ON/OFF) position.
5. PA640 becomes very warm, shuts OFF, but does not come back ON automatically.	<ul style="list-style-type: none"> • Set POWER switch (item 8, Fig. 3) to MANUAL OFF (OUT) position for 15 seconds, then back ON. If REMOTE ON/OFF jack is used, unplug for 15 seconds, then replug.

Fig. 9 A Multi-Zone System Using Two PA640's



PA640

Fig. 10 Block Diagram (Channels 1 and 2 only)



SPECIFICATIONS

Number of Channels	6
Power Output	
Rated Continuous Power, Each Channel:	8 Ohms 40 Watts
All 6 channels simultaneously driven, 20 Hz to 20 kHz, at rated THD.	
Short Term Continuous, Each Channel:	8 Ohms > 50 Watts
(2 channels driven, 1 kHz, at rated THD)	4 Ohms > 70 Watts
Bridged Power Output:	8 Ohms > 140 Watts
(Short Term Continuous, one pair driven @ 1 kHz, at rated THD)	
Rated THD	< 0.08 %
Damping Factor (@ 50 Hz, 1/2 rated power)	> 100
S/N Ratio, A Weighted (ref. to rated power)	> 100 dB
Frequency Response (@ 1 Watt, ± 3 dB)	8 Hz to 100 kHz
Input Sensitivity	Input Gain Position
	Max. 0.2 V
	Mid. 1.0 V
	Min. 3.3 V
Input Impedance	50 kOhms
Power Supply	120 VAC, 60 Hz
Power Consumption	No Signal 35 Watts (0.29 A)
	6 chan @ 1/10 rated power 265 Watts (2.2 A)
	6 chan @ rated power 640 Watts (5.3 A)
	3 chan Bridged @ 14 watts/chan ... 440 Watts (3.7 A)
Remote ON/OFF Voltage	+4V to +30V DC
Line Fuse Rating	5A 220V AC
Dimensions	13.5" L x 12.25" W x 3.6" H
Weight	14.3 lbs

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